

## Gulf of Alaska Play 5: Southeast Alaska Shelf Subbasin Play

### Geological Assessment

*GRASP UAI: AAAAA EAG*

*Play Area: 2,275 square miles*

*Play Water Depth Range: 300-1,600 feet*

*Play Depth Range: 3,000-6,000 feet*

*Play Exploration Chance: 0.18*

<b>Play 5, Southeast Alaska Shelf Subbasin, Gulf of Alaska OCS Planning Area, 2006 Assessment, Undiscovered Technically-Recoverable Oil &amp; Gas</b>			
Assessment Results as of November 2005			
<b>Resource Commodity (Units)</b>	<b>Resources *</b>		
	<b>F95</b>	<b>Mean</b>	<b>F05</b>
BOE (Mmboe)	0	109	379
Total Gas (Tcfg)	0.000	0.614	2.128
Total Liquids (bbl)	0	5,558	19,240
Free Gas** (Tcfg)	0.000	0.614	2.128
Solution Gas (Tcfg)	0.000	0.000	0.000
Oil (bbl)	0	0	0
Condensate (bbl)	0	5,558	19,240
<i>* Risked, Technically-Recoverable</i> <i>** Free Gas Includes Gas Cap and Non-Associated Gas</i> <i>F95 = 95% chance that resources will equal or exceed the given quantity</i> <i>F05 = 5% chance that resources will equal or exceed the given quantity</i> <i>BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas</i> <i>Mmb = millions of barrels</i> <i>Tcf = trillions of cubic feet</i>			

**Table 1**

Play 5, the “Southeast Alaska Shelf Subbasin” play, is the fifth most important (of six plays) in the Gulf of Alaska OCS Planning Area, with 8% (109 Mmboe) of the Planning Area energy endowment (1,454 Mmboe). The overall assessment results for play 5 are shown in [table 1](#). Dry gas forms 100% of the hydrocarbon energy

endowment of play 5. [Table 5](#) reports the detailed assessment results by commodity for play 5.

[Table 3](#) summarizes the volumetric input data developed for the *GRASP* computer model of Gulf of Alaska play 5. [Table 4](#) reports the risk model used for play 5. The location of play 5 is shown in [figure 1](#).

Most of the narrow continental shelf of southeastern Alaska is not prospective for hydrocarbons because total sedimentary thicknesses there are generally less than 2,000 feet, too thin for effective hydrocarbon accumulation. However, the Southeast Alaska shelf subbasin contains up to 20,000 feet of Cenozoic strata that overlie crystalline basement. The basement rocks here are probably comprised of metamorphic Mesozoic and Paleozoic rocks of the Alexander terrane, similar to that of the adjacent Prince of Wales Island. The Southeast Alaska subbasin is a transtensional wrench-fault basin that lies east of the Fairweather-Queen Charlotte fault system. It is structurally isolated and about 35 miles wide and 65 miles long.

Sedimentary rocks correlative to the Tertiary fill in the Southeast Alaska subbasin are not preserved anywhere in the nearby islands where older basement rocks of the Alexander terrane are exposed. The nearest exposures of Tertiary rocks are in the Neogene Skonun Formation on Queen Charlotte Island and in the offshore Queen Charlotte basin, which is over 150 miles to the southeast in coastal British Columbia. Skonun strata have favorable exploration potential in the southern part of the Queen Charlotte basin (Dietrich, 1995). There,

Skonun sandstones overlie potential source rocks of Triassic age of the Wrangellia terrane. However, 17 exploratory wells have been drilled in the Queen Charlotte basin with no discoveries of commercial quantities of hydrocarbon. According to Bustin (1997), Tertiary strata in the Queen Charlotte basin are dominated by gas-prone Type III organic matter. Furthermore, pre-Tertiary rocks beneath the Southeast Alaska subbasin are metamorphosed and offer no source potential. Thermal maturity for oil generation is possible in the central portion of the subbasin at depths below 13,500 feet, although oil-prone source rocks are not known to exist. Biogenic methane is likely generated in the depth range of 3,000 to 5,000 feet, similar to Cook Inlet.

Based upon this information, there is little likelihood for the occurrence of liquid hydrocarbon accumulations in the Southeast Alaska subbasin. Play 5 is, therefore, assessed as a dry gas play, analogous to the Tertiary biogenic gas fields of Cook Inlet. Gas recovery for play 5 is modeled on performance from upper Cook Inlet fields for Beluga and Tyonek Formation sandstone reservoirs.

Seismic data across the basin are restricted to a few reconnaissance lines, too sparse for prospect mapping. Trapping mechanism probably involves folds associated with wrench faulting and combination structural/stratigraphic traps. The Prospect size distribution is modeled on the size of upper Cook Inlet gas fields. The prospect number distribution is modeled on Tertiary gas pool density of upper Cook Inlet.

Play 5, Southeast Alaska Shelf Subbasin, Gulf of Alaska OCS Planning Area, 2006 Assessment, Conditional BOE Sizes of Ten Largest Pools			
Assessment Results as of November 2005			
Pool Rank	BOE Resources *		
	F95	Mean	F05
1	19	87	215
2	10	45	106
3	7	30	67
4	5	22	49
5	4.4	18	39
6	3.9	15	33
7	3.5	13	28
8	3.2	12	25
9	3.1	10.5	22
10	2.8	9.6	20
* Conditional, Technically-Recoverable, Millions of Barrels Energy-Equivalent (Mmboe), from "PSRK.out" file F95 = 95% chance that resources will equal or exceed the given quantity F05 = 5% chance that resources will equal or exceed the given quantity BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas			

**Table 2**

A maximum of 18 hypothetical pools is forecast by the aggregation of the risk model and the prospect numbers model for play 5. These 18 pools range in mean conditional (un-risked) recoverable volumes from 5 Mmboe (pool rank 18) to 87 Mmboe (pool rank 1). Pool rank 1 ranges in possible conditional recoverable volumes from 19 Mmboe (F95) to 215 Mmboe (F05), or in a gas case from 0.107 Tcfge (F95) to 1.208 Tcfge (F05). [Table 2](#) shows the conditional sizes of the 10 largest pools in play 5.

In the computer simulation for play 5 a total of 26,959 "simulation pools" were sampled for size. These simulation pools can be grouped according to the USGS size class system in which sizes double with each successive class. Pool size class 10 contains the largest share (7,789, or 29%) of simulation pools (conditional, technically

recoverable BOE resources) for play 5. Pool size class 10 ranges from 16 to 32 Mmboe. The largest simulation pool for play 5 falls within pool size class 15, which ranges in size from 512 to 1,024 Mmboe (or 2.9 to 5.8 Tcfge). [Table 6](#) reports statistics for the simulation pools developed in the *GRASP* computer model for play 5.

## GRASP Play Data Form (Minerals Management Service - Alaska Regional Office)

Basin: Gulf of Alaska  
 Play Number: 5  
 Play UAI Number: AAAAAEAG

Assessor: Comer / Larson  
 Play Name: Southeast Alaska Shelf Subbasin

Date: March, 2005

Play Area (mi<sup>2</sup>; millions of acres): 2,275 mi<sup>2</sup>, 1.456 million acres  
 Reservoir Thermal Maturity, % Ro: 0.2 - 0.5

Play Depth Range, feet: 3,000 - 4,000 - 6,000  
 Expected Oil Gravity, ° API: Biogenic Gas Play  
 Play Water Depth Range, feet: 300 - 950 - 1600  
 Prospect Distance from shore, miles: 25 - 45 - 65

### POOLS Module (Volumes of Pools, Acre-Feet)

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Prospect Area (acres)-Model Input	0				4700	---				12788			~
Prospect Area (acres)-Model Output	400	1727	2155	3118	4700	5656.0 / 3786.5	7085	8831	10252	12788	16401	19360	20000
Fill Fraction (Fraction of Area Filled)	0.2	0.21	0.25	0.31	0.4	.43030 / .17064	0.52	0.59	0.65	0.75	0.88	0.97	1
Productive Area of Pool (acres)	105	542	722	1168	1994	2699.90 / 2315.25	3403	4533	5505	7342	10152	12600	14067
Pay Thickness (feet)	19	48	57	74	100	110.674 / 52.868	135	159	177	208	250	282	526

### MPRO Module (Numbers of Pools)

Play Level Chance	0.6	Prospect Level Chance	0.3	Exploration Chance	0.18
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Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
		[ See Risking Sheet ]	

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	6	8	9	11	14	14.98 / 4.66	17	19	21	23	26	27	28
Numbers of Pools in Play	~	~	F59.21 = 0	F55 = 2	2	2.70 / 2.81	5	6	7	8	9	10	18

Minimum Number of Pools	0	Mean Number of Pools	2.7	Maximum Number of Pools	18
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### POOLS/PSRK/PSUM Module (Play Resources)

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Oil Recovery Factor (bbl/acre-foot)	N / A				~	---					~		~
Gas Recovery Factor (Mcfg/acre-foot)	375	556	594	663	750	762.558 / 141.960	848	906	947	1012	1090	1145	1480
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	N / A				~	---					~		~
Condensate Yield ((bbl/Mmcfg)	0.006	0.007	0.008	0.008	0.009	0.009 / 0.001	0.01	0.01	0.01	0.011	0.011	0.012	0.014

Pool Size Distribution Statistics from POOLS (1,000 BOE):  $\mu$  (mu) = 10.1854697  $\sigma^2$  (sigma squared) = 0.87118615 Random Number Generator Seed = 899241

BOE Conversion Factor (cf/bbl)	5620	Probability Any Pool Contains Both Oil and Free Gas (Gas Cap)	0
Probability Any Pool is 100% Oil	0	Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	N/A
Probability Any Pool is 100% Gas	1		

Table 3. Input data for Gulf of Alaska play 5, 2006 assessment.



# GRASP - Geologic and Economic Resource Assessment Model - PSUM Module Results

Minerals Management Service - Alaska OCS Region

GRASP Model Version: 8.29.2005)

Computes the Geologic Resource Potential of the Play

<b>Play UAI: AAAAAEAG</b>			<b>Play No. 5</b>		
World	Level	-	World	Level	Resources
Country	Level	-	UNITED	STATES	OF AMERICA
Region	Level	-	MMS	-	ALASKA REGION
Basin	Level	-	<b>GULF</b>	<b>OF</b>	<b>ALASKA</b>
<b>Play</b>	<b>Level</b>	-	<b>Play</b>		<b>5 Southeast Alaska Shelf Subbasin</b>
Geologist	Larson,	Comer			
Remarks	Play		5 Southeast	Alaska	SubBasin Neogene Sands
Run Date & Time:	Date		19-Sep-05	Time	14:03:33

## Summary of Play Potential

Product	MEAN	Standard Deviation
BOE (Mboe)	109,180	134,770
Oil (Mbo)	0	0
Condensate (Mbc)	6	7
Free (Gas Cap & Nonassociated) Gas (Mmcfg)	613,580	757,380
Solution Gas (Mmcfg)	0	0

10000 (Number of Trials in Sample)

0.5919 (MPhc [Probability] of First Occurrence of Non-Zero Resource)

Windowing Feature: used

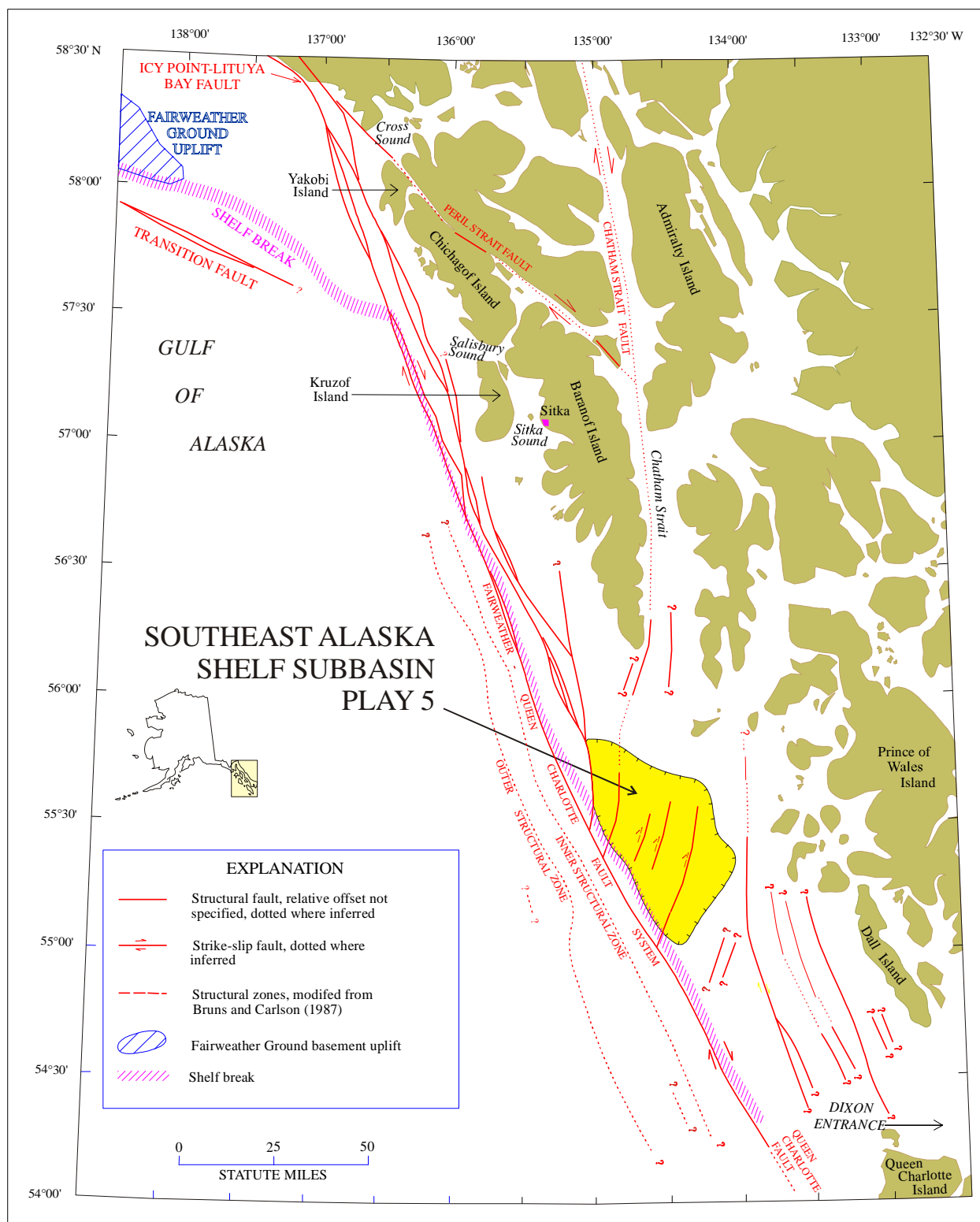
## Empirical Probability Distributions of the Products

Greater Than Percentage	BOE (Mboe)	Oil (Mbo)	Condensate (Mbc)	Free (Gas Cap & Nonassociated) Gas (Mmcfg)	Solution Gas (Mmcfg)
100	0	0	0	0	0
99.99	0	0	0	0	0
99	0	0	0	0	0
95	0	0	0	0	0
90	0	0	0	0	0
85	0	0	0	0	0
80	0	0	0	0	0
75	0	0	0	0	0
70	0	0	0	0	0
65	0	0	0	0	0
60	0	0	0	0	0
55	36,532	0	2	205,300	0
50	63,712	0	3	358,040	0
45	84,990	0	4	477,620	0
40	107,560	0	6	604,480	0
35	130,610	0	7	734,000	0
30	154,410	0	8	867,740	0
25	180,360	0	9	1,013,600	0
20	211,170	0	11	1,186,700	0
15	249,390	0	13	1,401,500	0
10	298,510	0	15	1,677,600	0
8	322,580	0	16	1,812,800	0
6	359,120	0	18	2,018,200	0
5	378,720	0	19	2,128,300	0
4	403,860	0	21	2,269,600	0
2	477,500	0	24	2,683,400	0
1	556,860	0	28	3,129,400	0
0.1	732,590	0	37	4,116,900	0
0.01	892,910	0	44	5,017,900	0
0.001	1,071,300	0	51	6,020,600	0

**Table 5.** Assessment results by commodity for Gulf of Alaska play 5, 2006 assessment.

Basin: GULF OF ALASKA Play 05 - Southeast Alaska Shelf Subbasin UAI Key: AAAAAEAG				Model Simulation "Pools" Reported by "Fieldsize.out" GRASP Module																	
Classification and Size				Pool Count Statistics			Pool Types Count			Mixed Pool Range		Oil Pool Range		Gas Pool Range		Total Pool Range		Pool Resource Statistics (MMBOE)			
Class	Min (MMBOE)	Max (MMBOE)	Pool Count	Percentage	Trial Average	Trials w/Pool Avg	Mixed Pool	Oil Pool	Gas Pool	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Total Resource	Average Resource
1	0.0312	0.0625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
2	0.0625	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
3	0.125	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
4	0.25	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
5	0.5	1	7	0.025965	0.0007	0.001182	0	0	7	0	0	0	0	0	1	1	1	1	1	0.516718	756.244242
6	1	2	87	0.322712	0.0087	0.014696	0	0	87	0	0	0	0	0	1	1	1	1	1	1.022490	1.593167
7	2	4	537	1.991914	0.0537	0.090709	0	0	537	0	0	0	0	0	1	3	1	3	1	2.000752	3.135854
8	4	8	2127	7.889759	0.2127	0.359291	0	0	2127	0	0	0	0	0	1	4	1	4	1	4.003781	6.213616
9	8	16	5087	18.869394	0.5087	0.859291	0	0	5087	0	0	0	0	0	1	6	1	6	1	8.001072	12.018196
10	16	32	7789	28.892021	0.7789	1.315709	0	0	7789	0	0	0	0	0	1	7	1	7	1	16.000440	23.246723
11	32	64	6588	24.437109	0.6588	1.112838	0	0	6588	0	0	0	0	0	1	8	1	8	1	32.000084	45.071659
12	64	128	3527	13.082829	0.3527	0.595777	0	0	3527	0	0	0	0	0	1	5	1	5	1	64.000697	87.809074
13	128	256	1077	3.994955	0.1077	0.181926	0	0	1077	0	0	0	0	0	1	3	1	3	1	128.134560	170.982803
14	256	512	128	0.474795	0.0128	0.021622	0	0	128	0	0	0	0	0	1	1	1	1	1	256.155117	321.260864
15	512	1024	5	0.018547	0.0005	0.000845	0	0	5	0	0	0	0	0	1	1	1	1	1	520.022643	534.553894
16	1024	2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
17	2048	4096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
18	4096	8192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
19	8192	16384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
20	16384	32768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
21	32768	65536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
22	65536	131072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
23	131072	262144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
24	262144	524288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
25	524288	1048576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000
Not Classified			0	0	0	0	Below Class		0	0	0	Below Class		0	0	0	0	0	0	0.000000	0.000000
Totals			26959	100.000008	2.6959	4.553885	Above Class		0	0	0	Above Class		0	0	0	0	0	0	0.000000	0.000000
Number of Pools not Classified: 0				Min and Max refer to numbers of pools of the relevant size class that occur within any single trial in the simulation.  Min and Max refer to aggregate resources of the relevant size class that occur within any single trial in the simulation.																	
Number of Pools below Class 1: 0																					
Number of Trials with Pools: 5920																					

**Table 6.** Statistics for simulation pools created in computer sampling run for Gulf of Alaska play 5, 2006 assessment.



**Figure 1.** Map location of Gulf of Alaska play 5, 2006 assessment.